

TRAC Innovation Report (FY15 to FY18)



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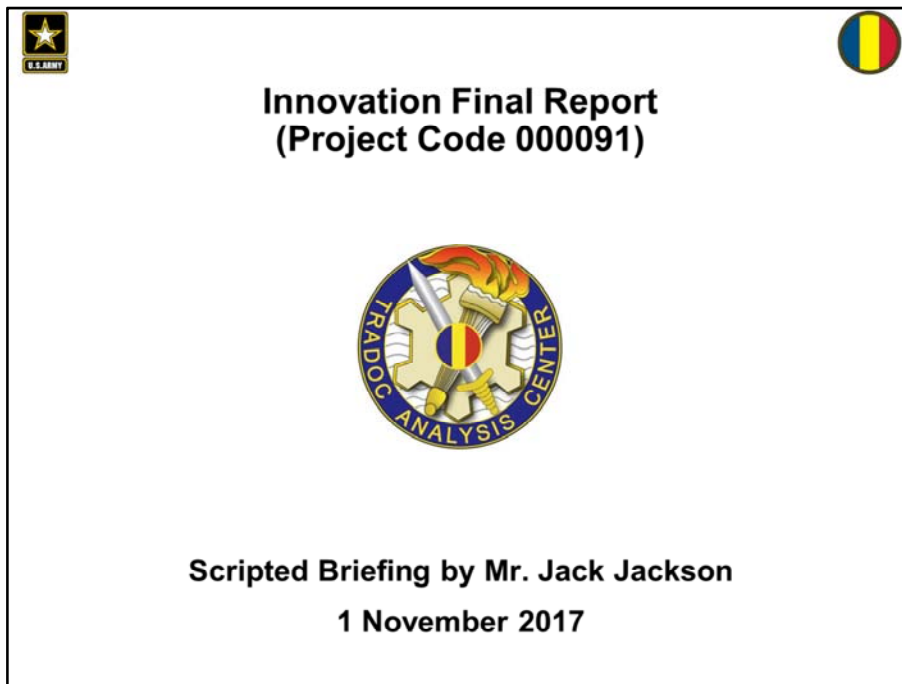
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In May and September 2014 the TRAC Innovation Community briefed the TRAC Board of Directors (BOD) on research that supports revitalizing innovation as a TRAC's core value. This scripted briefing incorporates content from those briefings and supporting material to report on the innovation research project in FY14 to FY15.

TRAC has historically embraced innovation as a core value and the intent of this research was to examine recent trends in innovation and establish knowledge to support TRAC innovation. Culture is the shared beliefs that motivate behavior.

We believe a process that provides a way for people to put ideas into valuable action can enable innovation in organizations. Innovation can be a sustainable, intentional process to help expand TRAC's value to the Army. Innovation can be learned, practiced, measured, and continuously improved. Ideas that allow innovation come from a variety of sources inside and outside of TRAC. Rapid, successful adoption of ideas requires leadership and support, but innovation is fundamentally a bottom up phenomena driven by people solving real problems. Finally, innovation is necessary for TRAC's long term survival and success.



Purpose and Outline



Briefing Purpose: Document TRAC research on innovation in FY14 and FY15.

Outline

- Defining innovation.
- TRAC innovation community.
- Individuals and innovation.
 - Creative diversity model.
 - Cognitive style and structure.
 - Engaging people.
- Leadership and innovation.
 - Entrepreneurial leadership.
 - Barriers to innovation.
 - Recommended practices.

Purpose of Study: Support innovation in TRAC by (1) identifying potential Center and OneTRAC innovations in order to better recognize and support innovation initiatives, and (2) identify barriers to innovation in TRAC and the Centers in order to provide Center leaders with opportunities to remove or reduce the barriers. Includes all Tiger Team efforts that are one time initiatives.

In 2014 TRAC establishes innovation leads in the Centers. The Center innovation lead(s) will work with the TRAC Technical Director and other Center innovation leaders to (1) identify potential Center and OneTRAC innovations in order to better recognize and support innovation initiatives, and (2) identify barriers to innovation in TRAC and the Centers in order to provide Center leaders with opportunities to remove or reduce barriers to innovation.



Academic Definition of Innovation



The noun **innovation** has three senses:

1. invention, **innovation** ~ a creation (a new device or process) resulting from study and experimentation.
2. invention, **innovation**, excogitation, conception, design ~ the creation of something in the mind.
3. initiation, founding, foundation, institution, origination, creation, **innovation**, introduction, instauration ~ the act of starting something for the first time; introducing something new.

Source: Princeton University "About WordNet." WordNet. Princeton University. 2010. <<http://wordnet.princeton.edu>>

Innovation has many definitions and has been a lively area of interest in academia, and both the public and private sector. TRAC seeks an operational definition of innovation that allows leaders and analysts to identify and understand innovation.




Operational Definition of Innovation



- Innovation is **people** putting **ideas** into valuable **action** in a **new** way. It is a substantial change; not incremental.
- Innovations come into existence through experimentation and learning.
- Related terms of reference:
 - **Opportunity**: a combination of circumstances creating the possibility for innovation.
 - **Cognitive capacity**: an individual's knowledge, skills, abilities and aptitude applicable to solving a problem.
 - **Cognitive style**: an individual's degree of preference for structure in problem solving activities.
 - **Divergence**: generating ideas or alternatives in problem solving.
 - **Convergence**: selecting among a set of alternatives in problem solving.

We propose an operational definition of innovation: people putting ideas into valuable action in a new way. Innovation generally signifies a substantial positive change and not just incremental improvement; however, innovation in an uncertain environment places a greater value on the pace of innovation than on the magnitude of innovation since this produces a culture of innovation. A culture of innovation helps produce agile and adaptive people and organizations.

	<h2>TRAC Innovation Community</h2>	
<p><u>Terms</u></p>	<p><u>Innovation Site</u></p>	
<p>Innovation is people putting ideas into valuable action in a new way.</p> <p>Innovation generally signifies a substantial positive change—not just incremental improvement.</p> <p>Innovation in organizations is a process that provides a way for people to put ideas into valuable action.</p>	<p>Promotes innovation.</p> <p>Provides a place to share and develop ideas that may become innovations.</p> <p>Tools:</p> <ul style="list-style-type: none"> • Innovation Blog • Innovation Wiki. <p>Anonymous ideas & comments welcome.</p>	
<p><u>What TRAC believes about Innovation</u></p>		
<p>Innovation can be a sustainable, intentional process.</p> <p>Innovation must be learned, practiced, measured, and continuously improved.</p> <p>Ideas that allow innovation come anywhere inside and outside of TRAC.</p> <p>Rapid, successful adoption of ideas requires leadership and support.</p> <p>Innovation is necessary for TRAC's long term survival and success.</p>		
<p>Innovation Community: Where Ideas Come to Grow</p>		

In 2014 TRAC established an innovation community to promote innovation and provide a place to share and develop ideas. This community explored theories of innovation. Practicing innovation is mostly art, but there is substantial scientific research about innovation. TRAC embraces several innovation concepts from research and practice. These concepts focus on the individual, group collaboration and the organizational environment.

TRAC provides a knowledge management system and communities of interest and practice to foster teamwork, collaboration and sharing. TRAC forms teams such as Tiger teams to develop knowledge and prototype new methods and practices such as measurement space and the analyst development program.



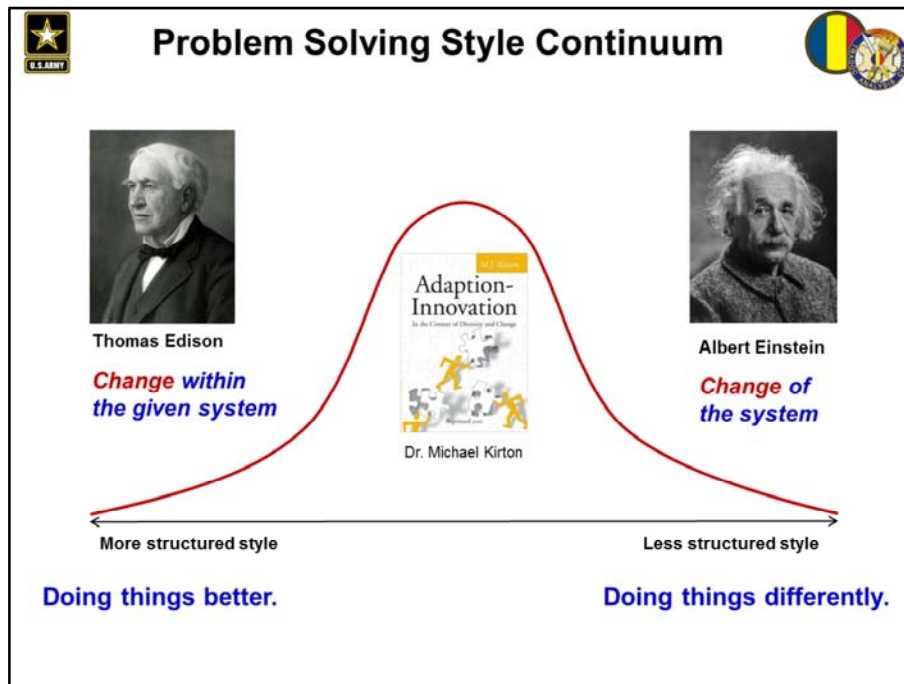
Creative Diversity Model



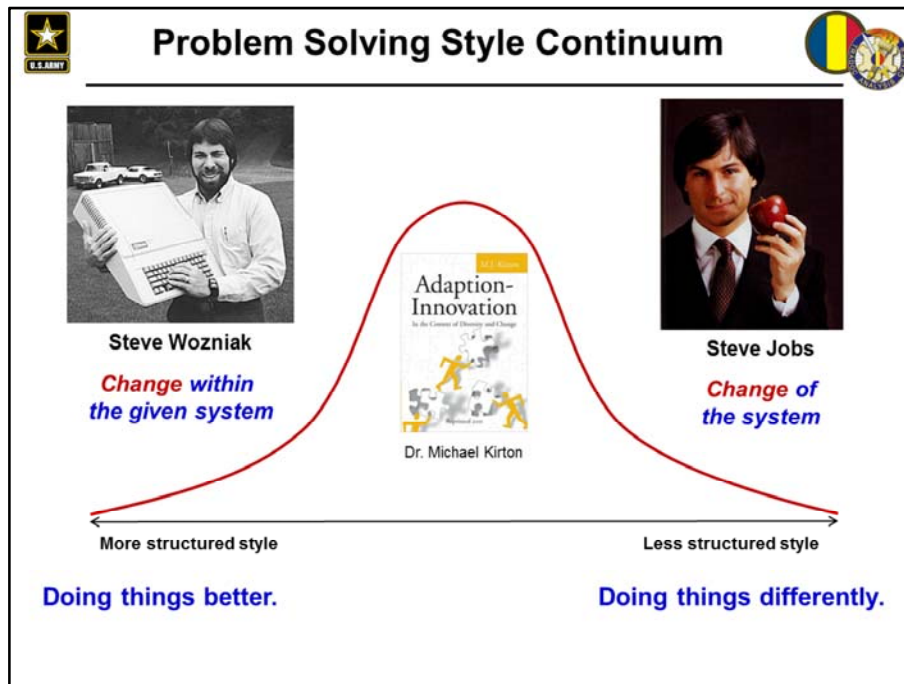
1. Everyone is creative.
2. Not everyone is creative in the same way.
3. Four key variables:
 - Level (our cognitive capacity).
 - Style (our cognitive style: preference for structure).
 - Motive (why we do it).
 - Opportunity (how we see opportunity).
4. There is no ideal combination for all situations.

Source: Dr. Kathryn Jablokow, PennState.

We wish to examine innovation as it applies to individuals, teams and organizations. We first establish a model that allows us to think about innovation as a creative endeavor. The creative diversity model claims that everyone is creative though not everyone is creative in the same way. It uses four key variables to describe differences in individual creativity: cognitive level, cognitive style (i.e., preference for structure), motive and opportunity (especially how one views opportunity). There is no ideal combination for all situations.



Michael Kirton describes an individual's problem solving style along a continuum that addresses individual preference for structure. At one extremes are individuals like Einstein, who change the system. They often want to do things differently and prefer less structure. At the other extreme are individuals like Edison, who make change within the given system. They want to do things better and prefer more structure.



While Kirton uses Einstein and Edison as his examples, we use Jobs and Wozniak, because both contributed to the innovations that Apple Computer brought to the world.

Kirton and others contend that there is a normal distribution of preference among people with most people in the middle. We believe that most analysts tend to prefer more structure while many change leaders prefer less structure. This can inform the role of analysts in supporting change.



Divergence and Convergence



- Creative thinking (from Guilford).
 - Divergent thinking: generating multiple ideas or alternatives.
 - Convergent thinking: narrowing down choices.
 - Everyone diverges and converges.
 - We do so differently because of our cognitive *level* and *style*.
- Cognitive Level:
 - Higher level implies more knowledge, skills, experience, aptitude, etc.
 - Expect more possibilities and more advanced thinking in divergence.
 - Expect more advanced principles in convergence.

The creative thinking process in problem solving that spurs innovation involves divergent and convergent thinking. Divergent thinking generates multiple ideas or alternatives while convergent thinking narrows down the choices. Everyone diverges and converges. We do so differently primarily because of our cognitive level and style.

A higher cognitive level implies more knowledge, skills, experience, aptitude, etc. We expect more possibilities and more advanced thinking in divergence from people with a higher cognitive level and we expect them to apply more advanced principles in convergence.



Cognitive Style and Problem Solving



	Less Structured Style	More Structured Style
Diverging	More methodical approach.	Shotgun approach.
	Scopes and bounds the landscape of alternatives.	Sometimes finds clusters or themes.
	Often uses analysis of existing structures.	Less concerned with existing structures.
Converging	More logical.	More idea driven.
	More meticulous.	Less concerned about details.
	Usually uses synthesis and integration.	Usually not concerned about fitting into current structures.

Cognitive style in the general population is normally distributed; most people are somewhere in the middle.

There are several differences between those with a more or less structured cognitive style in divergent and convergent thinking. In diverging those with a more structured style are more methodical in approach, scope and bound the landscape of alternatives, and often use analysis of existing structures. Those with a less structured style use a shotgun approach, sometimes find clusters or themes, and are less concerned with existing structures. In converging, those with a more structured style are more logical, more meticulous, and usually use synthesis and integration. Those with a less structured style are more idea drive, less concerned about details, and usually not concerned with fitting into current structures. Again, the population is normally distributed between the two extremes of cognitive style with most people somewhere in the middle.

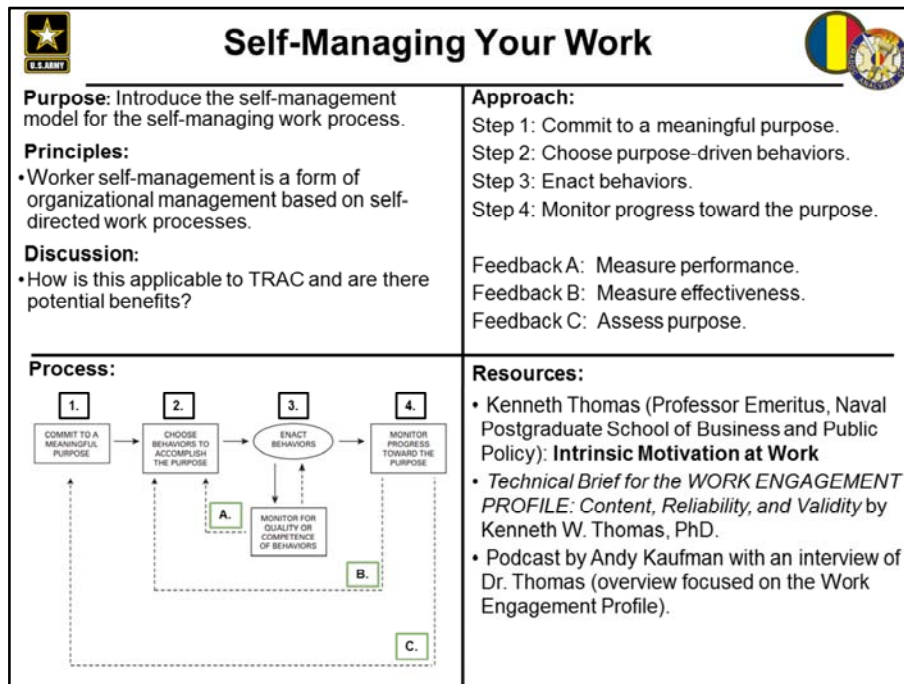


Paradox of Structure (Kirton)




- Any structure is both limiting and enabling.
- Example:
 - Children on fenced playground used all the space.
 - Children on an open playground did not.
- People see structure differently.
 - More structured thinkers will use the structure.
 - Less structured thinkers will abandon the structure.
- Myth: One must throw away structure to be creative.
- Fact: A problem solving process such as scientific method eventually forms the basis for solving most complex problems
- Claim: Change happens by alternately loosening and tightening structure

Structure is critical to innovation. Any structure is both limiting and enabling. People see structure differently. More structured thinkers will use the structure. Less structured thinkers will abandon the structure. We believe it is a myth that one must throw away structure to be creative. In fact, a problem solving processes such as the scientific method eventually forms the basis for solving most complex problems. Change happens by alternately loosening and tightening structure. Since innovation usually involves an iterative process of reducing and adding structure, most innovative ideas are put into practice by diverse teams.




Professor Kenneth Thomas at NPS and other researchers have examined how work in modern organizations has evolved with a focus on individual motivations and the relationship between the individual and the supervisor. They advocate a self-management model. While this model is not without controversy, it does provide some potential utility. In particular, it stresses the need for individuals to gain intrinsic motivation through responsibility for their purpose-driven behaviors and guides leaders to provide meaningful purpose for work.

The model has four defined steps and three feedback loops among the steps. The individual assess or measures performance on purpose-driven behaviors (A). The individual and supervisor assess or measures effectiveness of behaviors (B) recognizing that a feature of modern work is that the individual does not control outcomes completely. As work progresses, the supervisor and individual assess whether the purpose remains appropriate and sometimes revise that purpose.



Liberating Structures: Group Interaction



<p>Impromptu Networking Rapidly share challenges and expectations, building new connections.</p> <p>9 Whys Make the purpose of your work together clear.</p> <p>What, So What, Now What? Together, look back on progress to date and decide what adjustments are needed.</p> <p>TRIZ Stop counterproductive activities & behaviors to make space for innovation.</p> <p>Appreciative Interviews Discover & build on the root causes of success.</p> <p>1-2-4-All Engage everyone simultaneously in generating questions/ideas/suggestions.</p> <p>User Experience Fishbowl Share know-how gained from experience with a larger community.</p> <p>15% Solutions Discover & focus on what each person has the freedom and resources to do now.</p> <p>25-10 Crowd Sourcing Rapidly generate & lift a group's most powerful actionable ideas.</p> <p>Troika Consulting Get practical and imaginative help from colleagues immediately.</p> <p>Conversation Café Engage everyone in making sense of profound challenges.</p>	<p>Min Specs Specify only the absolute "must do's" & "must not do's" for achieving a purpose.</p> <p>Wise Crowds Tap the wisdom of the whole group in rapid cycles.</p> <p>Wicked Questions Articulate the paradoxical challenges that a group must confront to succeed.</p> <p>Drawing Together Reveal insights & paths forward through non-verbal expression.</p> <p>Improv Prototyping Develop effective solutions to chosen challenges while having serious fun.</p> <p>Agreement-Certainty Matrix Sort challenges into simple, complicated, complex and chaotic domains.</p> <p>Shift & Share Spread good ideas and make informal connections with innovators.</p> <p>Heard, Seen, Respected Practice deeper listening and empathy with colleagues.</p> <p>Social Network Webbing Map informal connections & decide how to strengthen the network to achieve a purpose.</p> <p>Design Storyboards Define step-by-step elements for bringing projects to productive endpoints.</p> <p>Open Space Liberate emergent action and leadership in large groups.</p>	<p>Discovery & Action Dialogue Discover, spark & unleash local solutions to chronic problems.</p> <p>Integrated-Autonomy Move from either/or to robust both-and solutions.</p> <p>Generative Relationships Reveal relationship patterns that create surprising value or dysfunction.</p> <p>Critical Uncertainties Develop strategies for operating in a range of plausible yet unpredictable futures.</p> <p>Purpose-To-Practice Define the five elements that are essential for a resilient & enduring initiative.</p> <p>Ecocycle Planning Analyze the full portfolio of activities & relationships to identify obstacles and opportunities for progress.</p> <p>Panarchy Understand how embedded systems interact, evolve, spread innovation, and transform.</p> <p>What I Need From You Surface essential needs across functions and assign or request requests for support.</p> <p>Celebrity Interview Reconnect the experience of leaders and experts with people closest to the challenges at hand.</p> <p>Helping Heuristics Practice progressive methods for helping others, meaning help, and asking for help.</p> <p>Simple Ethnography Observe & record actual behavior of users in the field.</p>
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Keith McCanless & Henri Lipmanowicz www LiberatingStructures.com

Overview:

- Five conventional structures guide the way we organize routine interactions and how groups work together: presentations, managed discussions, open discussions, status reports and brainstorm sessions.
- Liberating Structures add more options to the big five conventional structures.

Resources:

- Red Team and Army Logistic University Guide (FOUO).
- University of Foreign Military and Cultural Studies Liberating Structures Handbook.
- <http://www LiberatingStructures.com/ls-menu/>
- <http://www groupjazz.com/>

We now turn to the issue of group or team interactions. How people meet and interact are critical to an organization's ability to effectively develop ideas for innovation and refine those ideas into action. Research has identified five conventional structures that guide the way we organize routine interactions and how groups work together: presentations, managed discussions, open discussions, status reports and brainstorm sessions. Liberating Structures add more options to the big five conventional structures.

Liberating Structures are easy-to-learn microstructures that enhance relational coordination and trust. They quickly foster lively participation in groups of any size, making it possible to include everyone. Liberating Structures are an innovation that can replace more controlling or constraining approaches.

The Liberating Structures website along with other resources such as the Liberating Structures Handbook from the University of Foreign Military and Cultural Studies can assist analysts in using these engagement strategies.

Inspirational Leadership

Transformational Leadership

- Focus on the organization.
- Changing attitudes.
- Focus on change.
- Passion.
- A stake in the ground.
- Creative rearrangement.
- Committed investment.
- Symbolic communications.
- Long-term; stay the course.

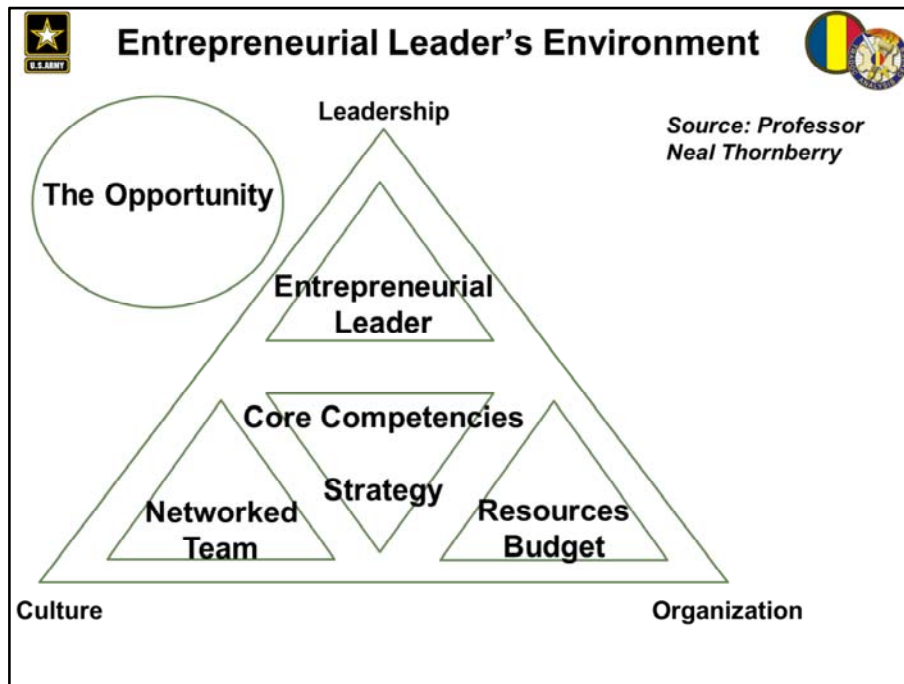
Entrepreneurial Leadership

- Focus on the opportunity.
- Finding like-minded people.
- Focus on building & creating.
- Passion.
- A moving stake.
- Creative destruction.
- Staged investments.
- Personal communications.
- Medium-term with exit strategy.

UNCLASSIFIED

In an organization, innovation occurs more often in a suitable environment with the proper culture. TRAC Center leaders use many common innovation supporting practices to varying degrees. Center innovation leads encourage and monitor these practices.

Professor Neal Thornberry at the Naval Postgraduate School has studied innovation in the private and public sectors. He describes two models of inspirational leadership: Transformative Leadership and Entrepreneurial Leadership. Most innovative leaders in TRAC will practice Entrepreneurial Leadership with a focus on opportunities using like-minded people to focus on building and creating value through creative destruction with staged investments influencing others through personal communications.



An entrepreneurial leader spots an opportunity and brings it into the organization taking advantage of the organization's leadership, culture, and organizational structure. He or she uses core competencies, existing strategies, and resources through a networked team of like-minded people.

Thornberry identifies a set of leadership competencies that focus on value creation as part of the manager's job and demonstrates how a small number of entrepreneurial leaders can create a substantial competitive advantage for their organizations. For more details, see *Lead Like an Entrepreneur: Keeping the Entrepreneurial Spirit Alive within the Corporation* (McGraw-Hill, 2007).



Leading Strategic Innovation In Organizations



- **Individual Constraints (Psychology).**
 - Innovation is a problem of having creative ideas.
 - We sometimes stop innovation by not "thinking different".
 - *Overcome constraints of perception, intellection, and expression.*
- **Group Constraints (Social Psychology).**
 - Innovation is a group problem
 - We do not get support for ideas because of adverse group dynamics.
 - *Overcome constraints of emotion, culture, and process in groups as well as the environment within which groups work.*
- **Organizational Constraints (Management Science).**
 - Innovation is a problem of organization; organization is the antithesis of innovation.
 - *Overcome the constraints of strategy, structure, and resources.*

Source: Professor David A. Owens, Vanderbilt University.

Professor David A. Owens, Vanderbilt University asks why innovation is hard. His answers: We do not find a good problem; We do not generate good ideas; We do not choose the best idea; and We do not anticipate the innovation constraints! Constraints are something we can focus on, agree on, and measure. Furthermore, constraints are exactly what drives adoption.

Professor Owens also asks why innovations fail. His answers: an individual does not enlarge his or her toolset; he or she is not challenged to 'think different'; a group's culture does not support risk; new ideas are killed by group members' behaviors; an organization is not structured to support innovation; innovation is not considered strategic; change is not wanted; a market is not offered utility and value; the adopters (users) fails to recognize an opportunity; a society doesn't accept an innovation as legitimate; it does not support values and aspirations; a technology is not fully developed or the innovation is not quite ready for prime time.

He explores these concepts by applying the lenses of various disciplines to innovation. Looking across these scientific disciplines we see six common

barriers to innovation:

1. Individual constraints: Psychologists treat innovation as a problem of having creative ideas. We sometimes stop innovation by not "thinking different". Overcome constraints of perception, intellection, and expression.

2. Group constraints: Social psychologists treat innovation as a group problem. We often do not get early support for our ideas because of adverse group dynamics. Overcome constraints of emotion, culture, and process in groups as well as the environment within which groups work.

3. Organizational constraints: The field of management sees innovation as a problem of organization; organization is considered the opposite of innovation. Overcome the constraints of strategy, structure, and resources.



Leading Strategic Innovation In Organizations (Prof. David A. Owens, Vanderbilt University)



- **Industry Constraints (Economics).**
 - Innovation is a problem of adoption.
 - If there is no market, it is not an innovation—just a creative idea.
 - *Relax constraints of competition, suppliers, and markets.*
- **Societal Constraints (Sociology and Anthropology).**
 - Societies obstruct innovations dangerous or contrary to societal values.
 - *Avoid constraints of identity, social control, and history.*
- **Technological Constraints (Engineers and Scientists).**
 - Failed innovation is a failure of technology.
 - If it does not work, it is not an innovation.
 - *Work with the constraints of knowledge, time, and the natural environment.*

Source: Professor David A. Owens, Vanderbilt University.

4. Industry constraints: Economists see failed innovation as a problem of adoption. When there's no market to adopt it, it is not an innovation—just a creative idea. Relax constraints of competition, suppliers, and markets.

5. Societal constraints: The sociological and anthropological perspective suggests that societies control or obstruct innovations deemed as dangerous or contrary to societal values. Avoid constraints of identity, social control, and history.

6. Technological Constraints: Engineers and scientists see failed innovation as a failure of technology. If it does not work, it is not an innovation. Work with the constraints of knowledge, time, and the natural environment.

Leaders in TRAC remove or reduce these barriers to provide an environment and culture that fosters innovation. TRAC innovation leads in each of the Centers focus effort on identifying barriers, developing strategies for reducing or eliminating barriers, and informing their leadership and Center personnel about these efforts.



Ten Recommended Best Practices for Innovative Organizations



- **Use Technology to Collaborate and Share Knowledge.**
- **Promote Innovation as an Organizational Value.**
- **Include Innovation as a Leadership Development Competency.**
- **Tie Compensation to Innovation.**
- **Develop an “Idea-finding” Program.**
- **Fund Outside Projects.**
- **Train for Creativity.**
- **Create a Review Process for Innovative Ideas.**
- **Recruit for Creative Talent.**
- **Reward Innovation with Engaging Work.**

Source: The Institute for Corporate Productivity published a study surveying some of the top companies and people in the fields of management and innovation.

Finally, we consider recommendations for best practices published by the Institute for Corporate Productivity. The innovation supporting practices in the fields of management and innovation are to: (1) Use technology to collaborate and share knowledge, (2) Promote innovation as an organizational value, (3) Include innovation as a leadership development competency, (4) Tie compensation to innovation, (5) Develop an “Idea-finding” program, (6) Fund outside projects, (7) Train for creativity, (8) Create a review process for innovative ideas, (9) Recruit for creative talent, and (10) Reward innovation with engaging work.



Innovation Final Report



Conclusion

In FY14 and FY15 TRAC focused on revitalizing innovation in order to ensure that TRAC remains the Army's premiere analytic organization. TRAC examined innovation research and practice to gain knowledge and approaches to foster more innovation. This report summarizes that effort.